



Armed Forces College of Medicine

AFCM



Histological Structure of the Pancreas

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Prof. of Histology and Cell Biology

INTENDED LEARNING OBJECTIVES (ILO)



By the end of this lecture the student will be able to:

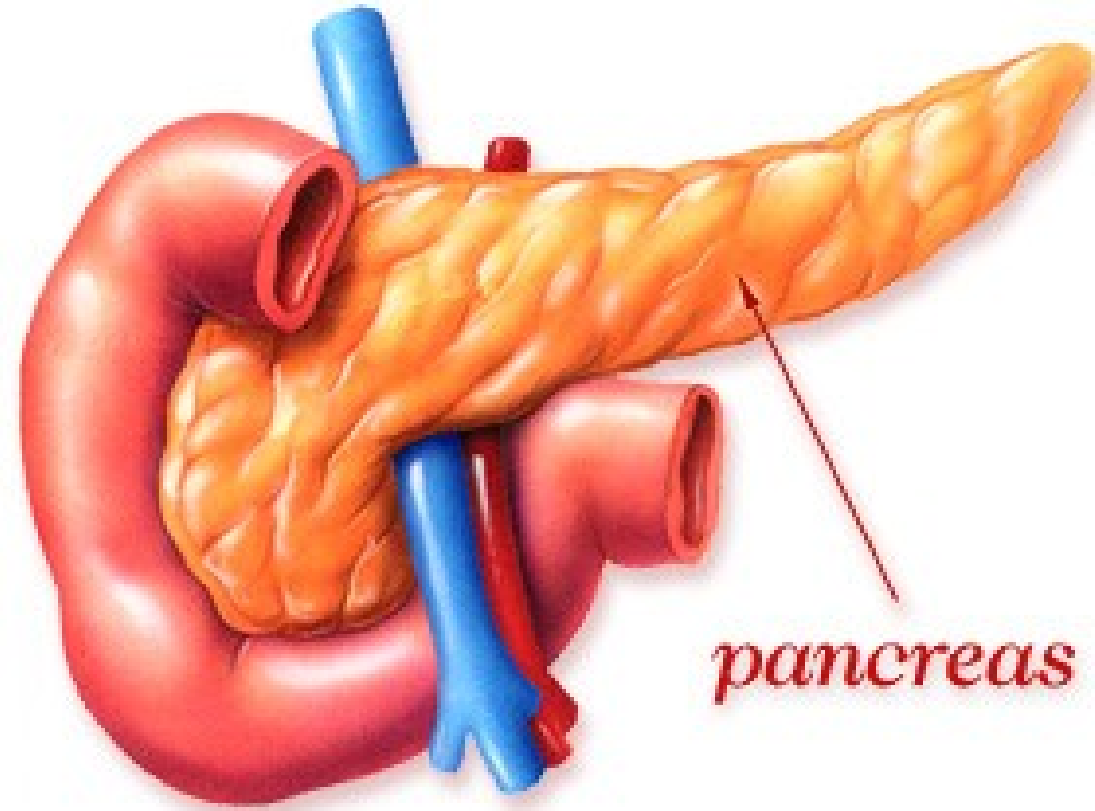
- Describe the microscopic structure of the exocrine pancreas.
- Correlate the structure of the cells lining the pancreatic acini to their function

Key points of this lecture

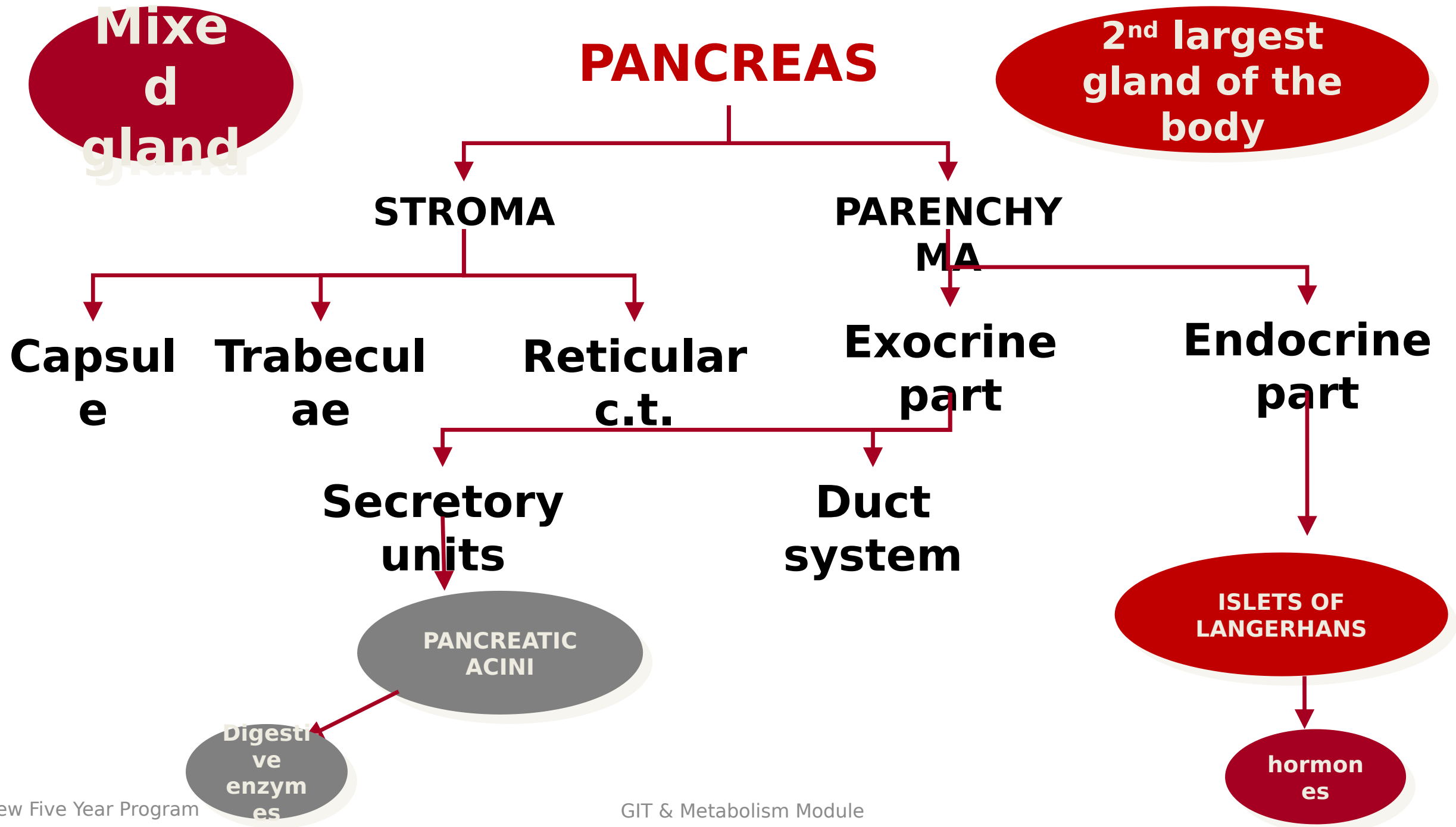


- Microscopic structure of exocrine pancreas
- Structure/ function relationship of exocrine pancreas
- Differences and similarities between pancreas and parotid glands

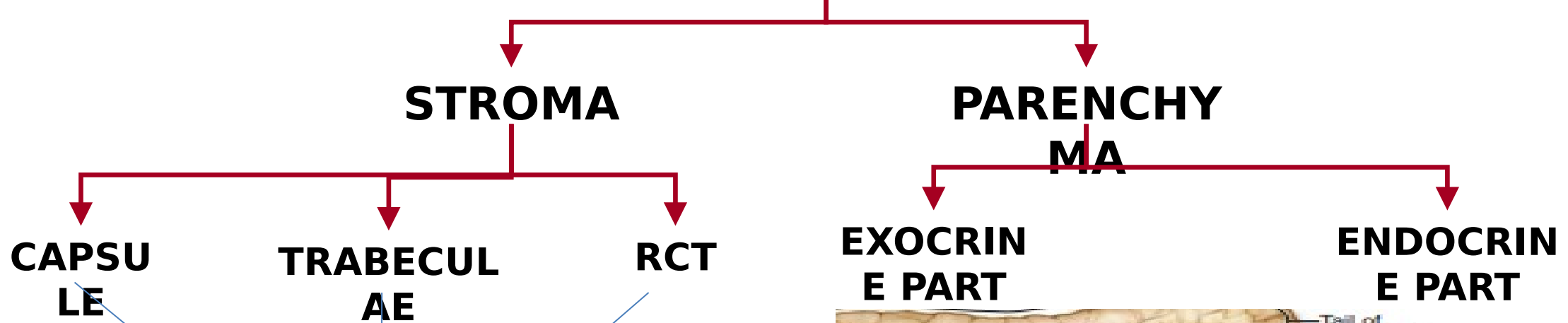
Pancreas



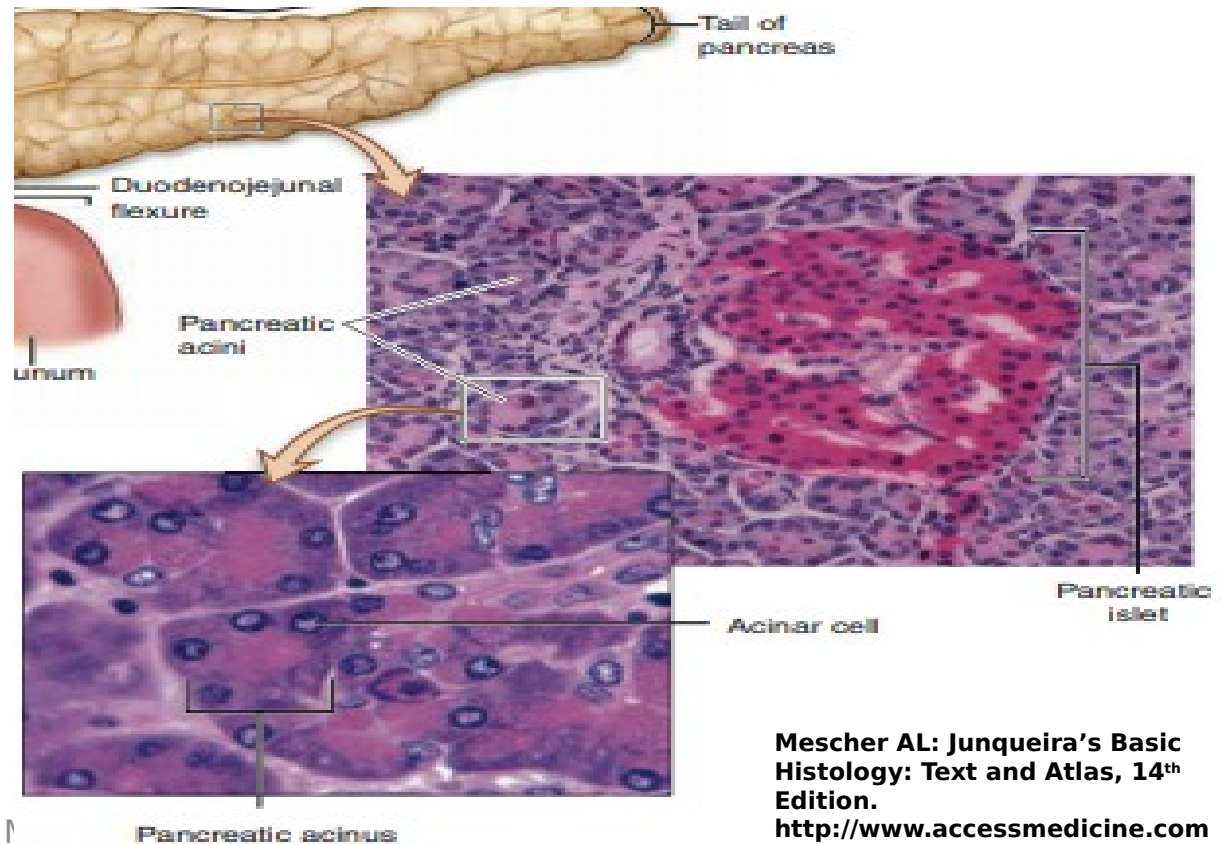
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Pancreas



Thin & delicate



Mescher AL: Junqueira's Basic Histology: Text and Atlas, 14th Edition.
<http://www.accessmedicine.com>

Pancreas



Which of the following best describes the stroma of the pancreas?

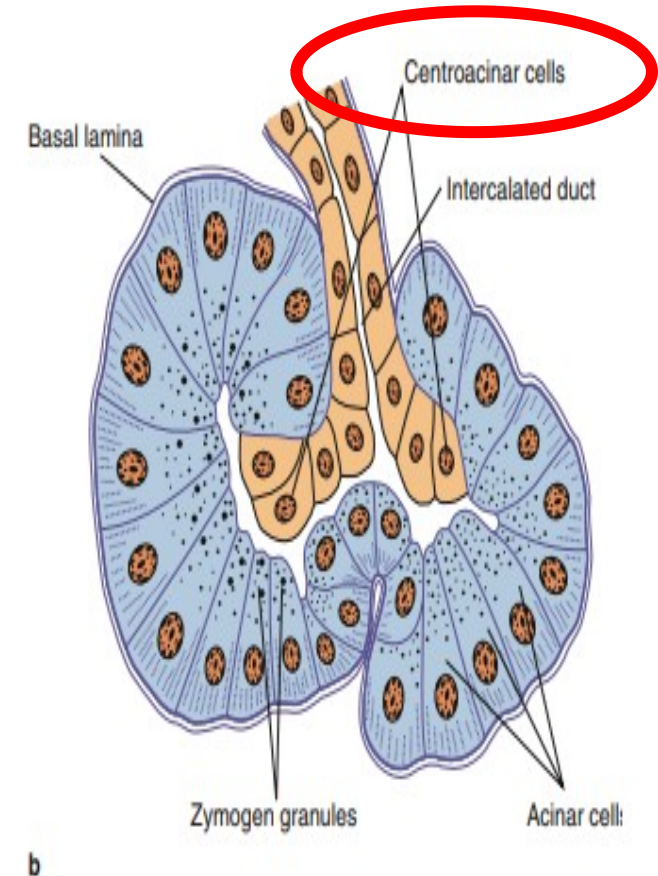
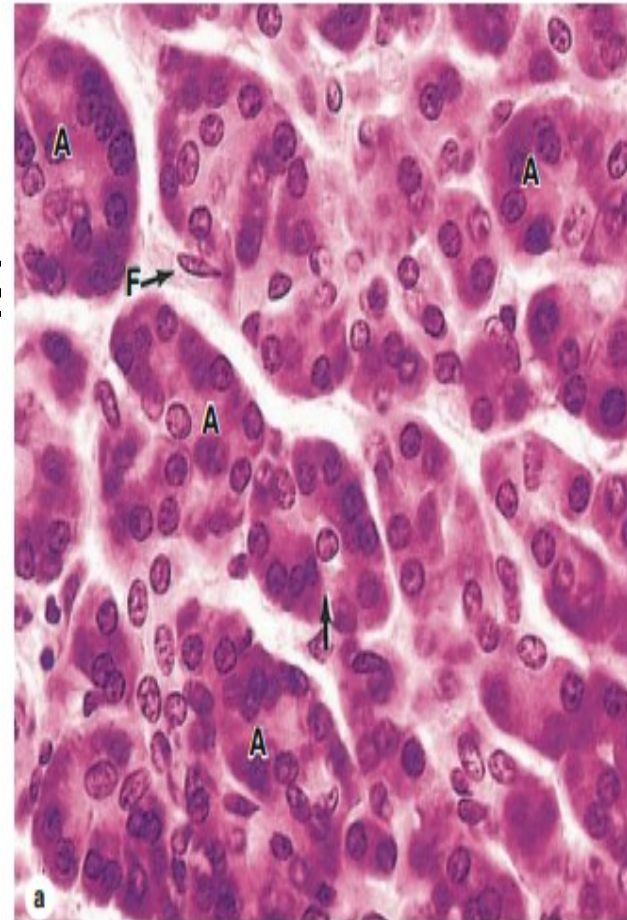
- a. It contains numerous elastic fibers
- ☒ b. It is thin and delicate
- c. It is thick and coarse
- d. It contains many fat cells

Exocrine Pancreas



Serous acini

- Pyramidal cells arranged around a central lumen.
- Nucleus is spherical, basal & vesicular.
- Cytoplasm: basal basophilic striations & Apical acidophilic large zymogen granules
- The lumen contains centroacinar cells
- No myoepithelial cells



Mescher AL: Junqueira's Basic Histology: Text and Atlas, 14th Edition.
<http://www.accessmedicine.com>

Exocrine Pancreas

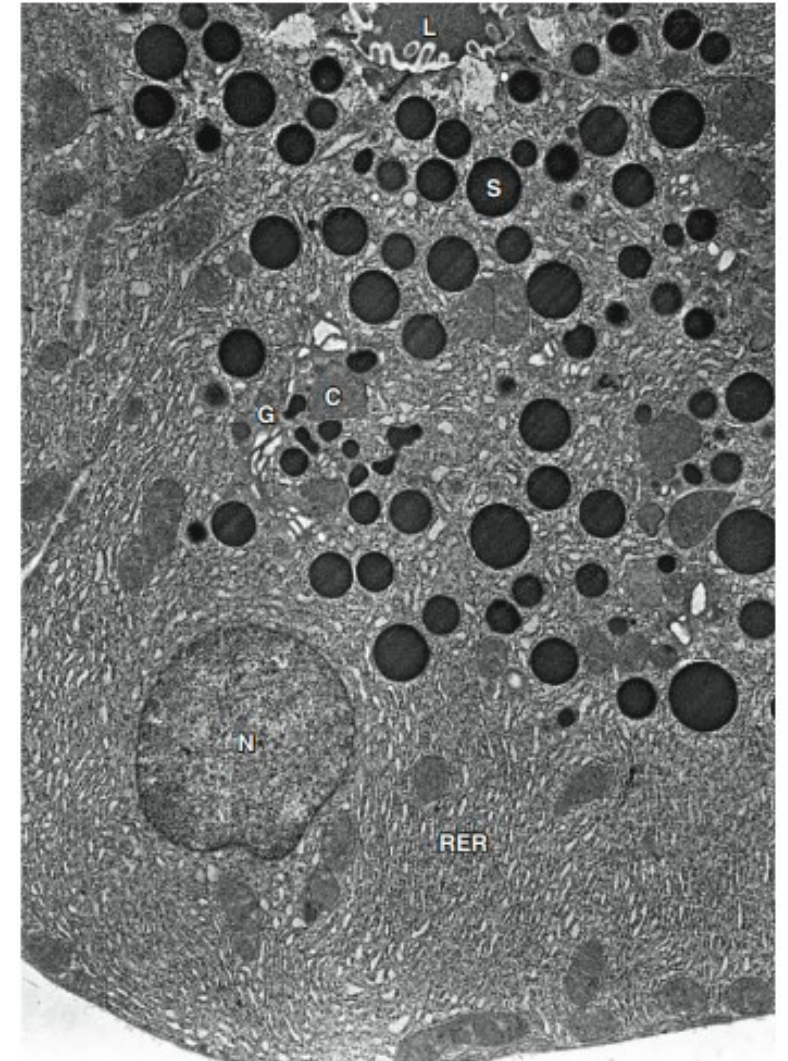


Serous acini

EM:

- Basal rER.
- Elongated basal mitochondria.
- Supranuclear well developed Golgi apparatus.
- Apical zymogen granules (inactive enzymes).
- Junctional complexes between acinar cells.

**Basophilic
striation**



Mescher AL: Junqueira's Basic Histology: Text and Atlas, 14th Edition.
<http://www.accessmedicine.com>

Lecture quiz

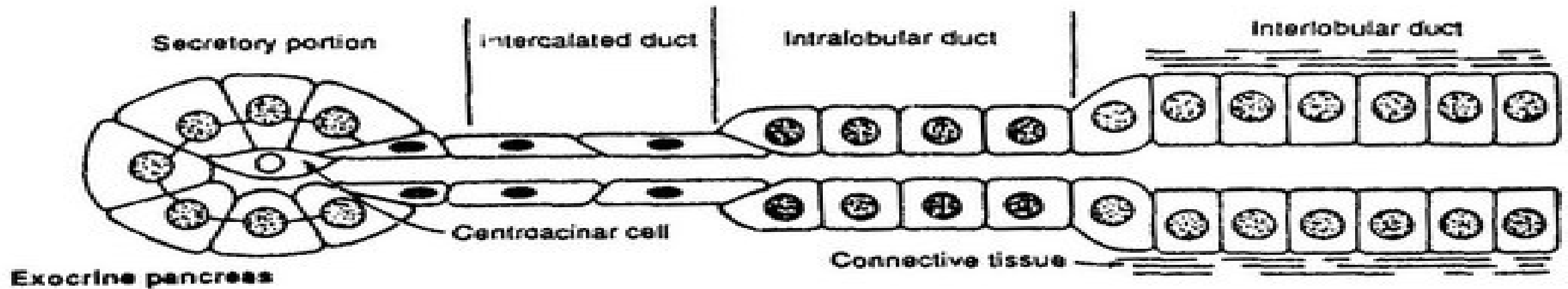


Which of the following is a characteristic feature of pancreatic acinar cells?

- a. Numerous SER
- b. Many lysosomes
- ☒ c. Prominent Golgi apparatus
- d. Basal granules.

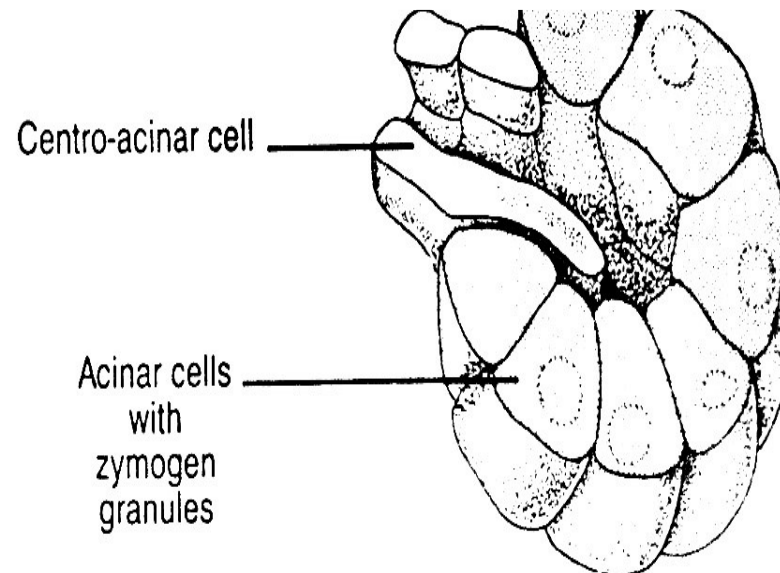


Exocrine Pancreas



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SECRETORY UNITS



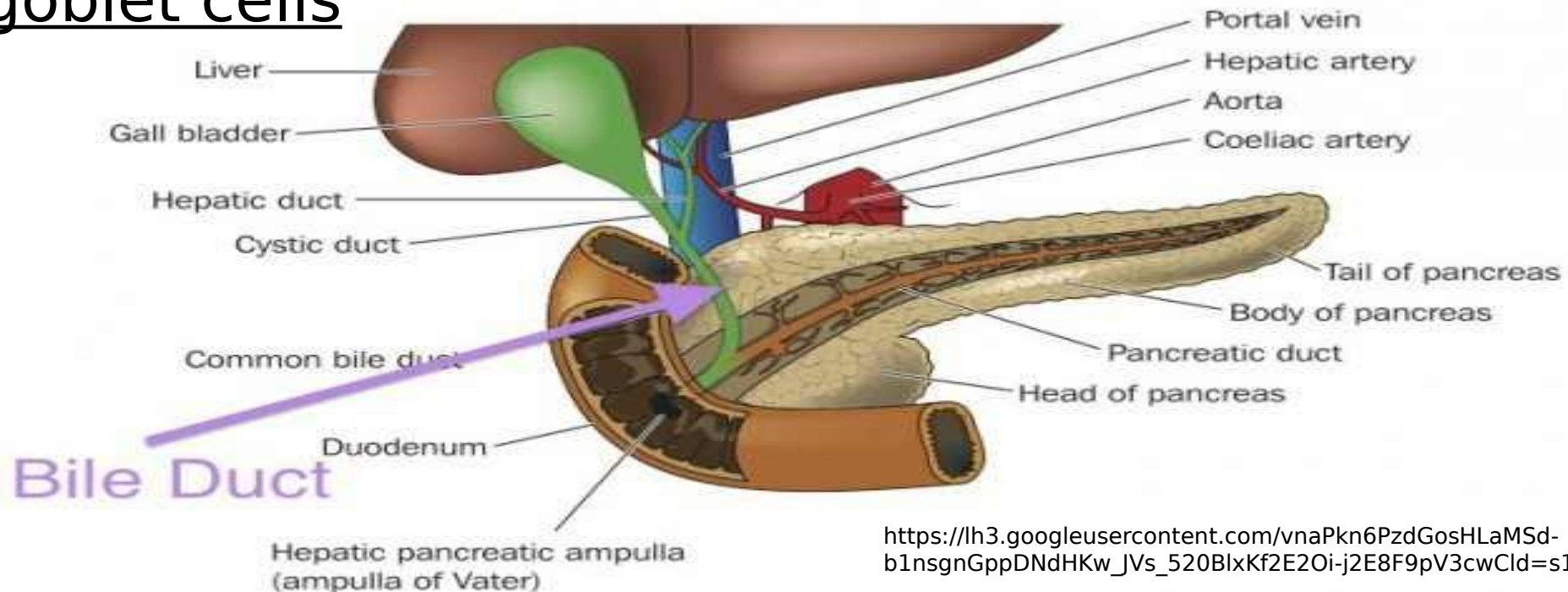
DUCT SYSTEM

- Centro-acinar cells
- Intercalated duct
- Intralobular duct
- Interlobular duct
- Main pancreatic duct

The Duct System



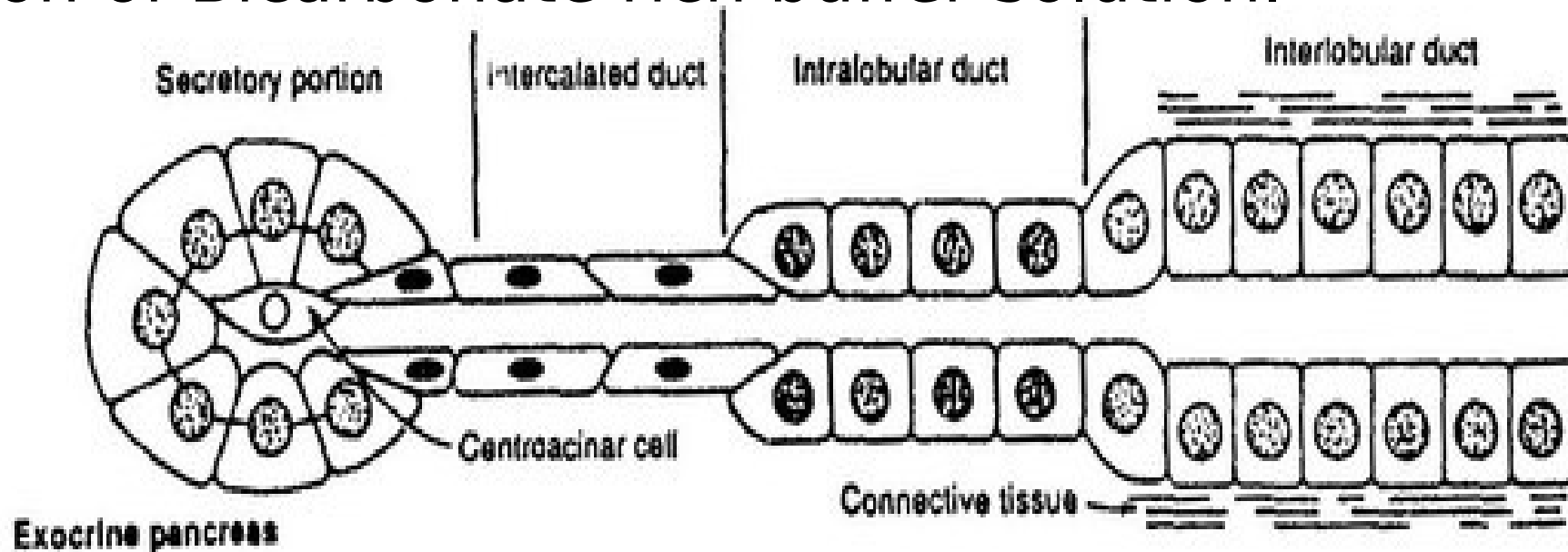
- Centro acinar cells
- Intercalated ducts
- Intralobular collecting duct.
- Interlobular ducts
- Main & Accessory Pancreatic ducts: Simple columnar, EEC & goblet cells



Exocrine Pancreas (Function)



- Secretion of amylase, lipase, ribonuclease and elastase.
- Secretion of **proenzymes**: trypsinogen and chemotrypsinogen. (activated after reaching the duodenum)
- Secretion of Bicarbonate rich buffer solution.





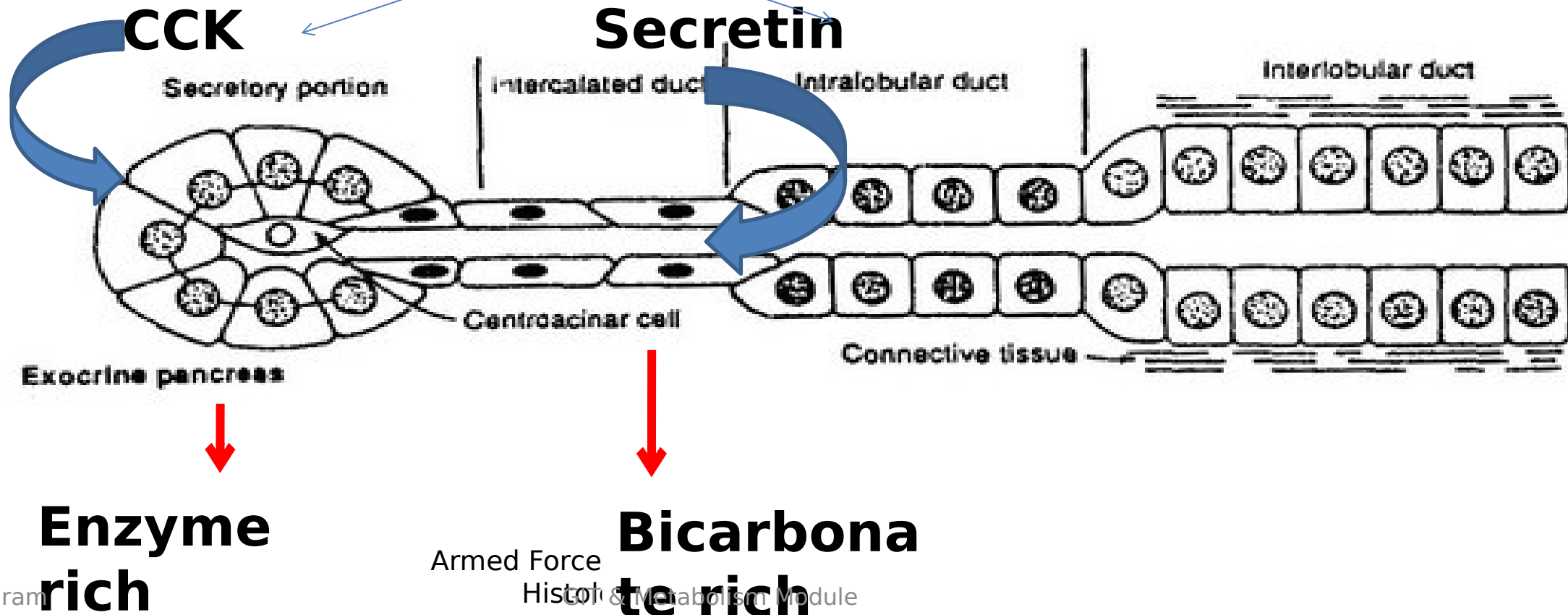
Mechanism of protection against autodigestion of pancreas:

- 1-** Pancreatic enzymes are stored in inactive forms & activated only in the duodenal mucosa by **enterokinase**
- 2-** Cytoplasm of **acinar** cells contains **trypsin inhibitor**

Exocrine Pancreas (Function)



- Secretion of pancreatic enzymes is under **nervous and hormonal control**:
 - Parasympathetic stimulates secretion.
 - Hormonal control: from intestinal **enteroendocrine** cells:



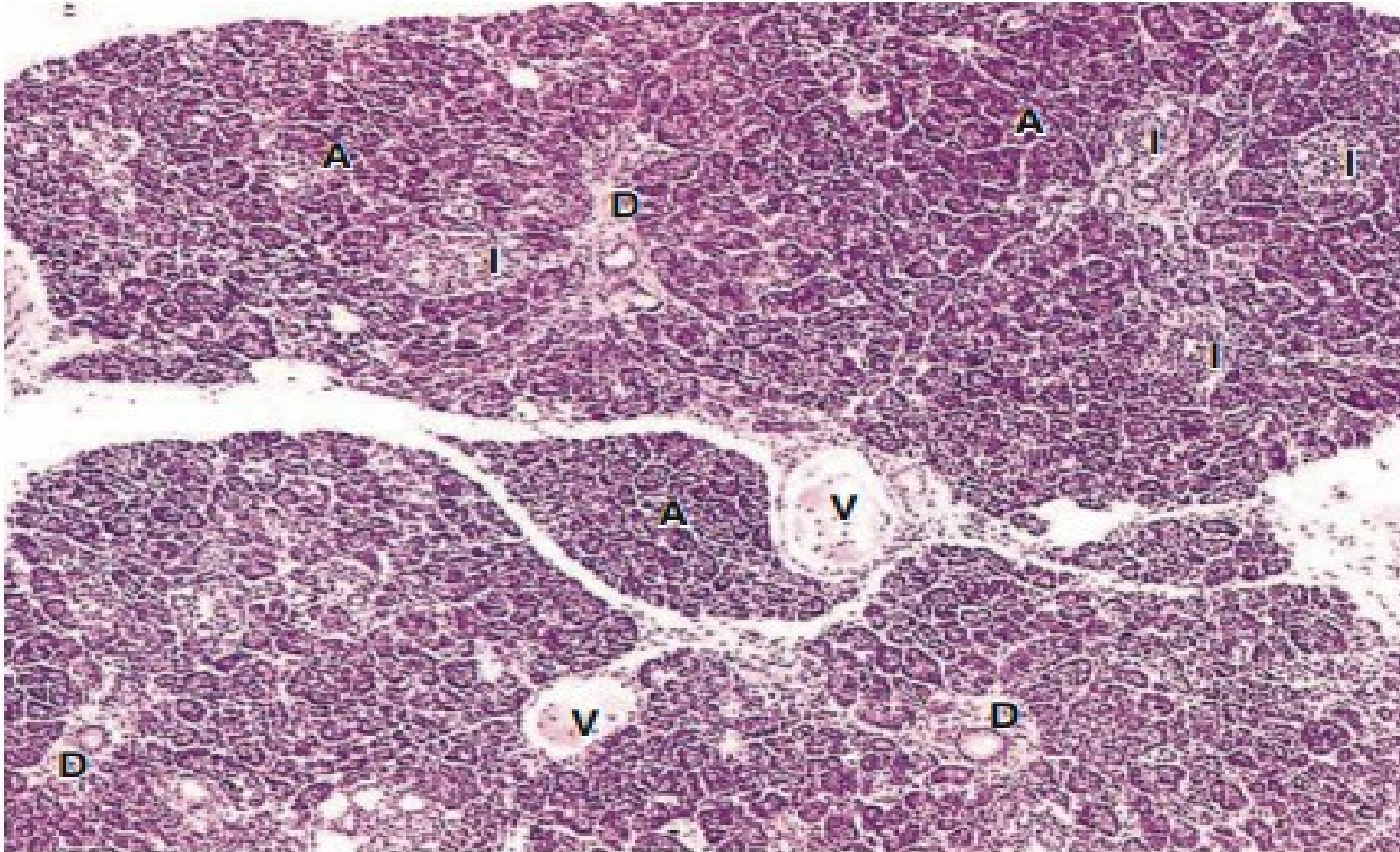
PANCREAS

PAROTID



Capsule	Thin	Thick
Trabeculae	Thin and loose	Thick and fibrous
Acini:	Larger and variable shape	Smaller and rounded
Serous	Centro-acinar cells	Absent
Ducts	Relatively few	Numerous
Striated duct	Absent	Numerous
Main duct	Col, EEC & goblet cell	St sq.non ker.
Islets of langerhans	Present	Absent

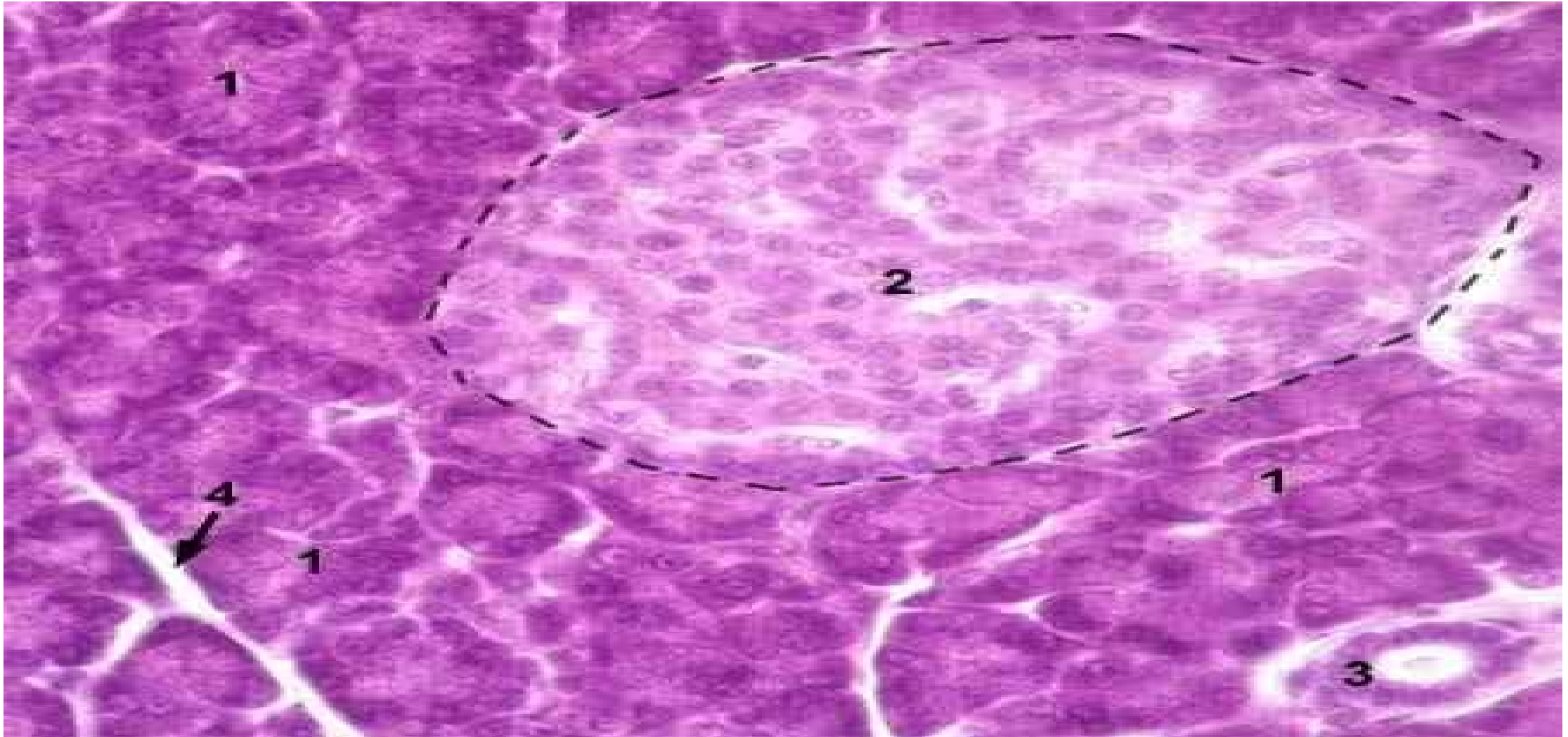
Exocrine Pancreas



Low-power view of pancreas includes several islets (I) surrounded by many serous acini (A). The larger intralobular ducts (D) are lined by simple columnar epithelium. The ducts and blood vessels (V) are located in connective tissue, which also provides a thin capsule to the entire gland and thin septa separating the lobules of secretory acini. (X20; H&E)

Mescher AL: Junqueira's Basic Histology: Text and Atlas, 14th Edition.
<http://www.accessmedicine.com>

Pancreas



https://www.google.com.eg/url?sa=i&source=images&cd=&ved=2ahUKEwifsKa1y_TIAhUmz4UKHXt0AjQQjRx6BAgBEAQ&url=https%3A%2F%2Fwww.pinterest.com%2Fpin%2F369928556873825738%2F&psig=AOvVaw01I2yAKrpOj7_

Medical Application



Acute pancreatitis:

The proenzymes may be activated and digest pancreatic tissues, leading to very serious complications. Possible causes include infection, gallstones, alcoholism, drugs, and trauma.

—

	parotid	Sublingual	submandibular	Pancreas
Secretory acini	Pure serous	predominantly mucous	predominantly serous	Pure serous but larger acini
Centro-acinar cells	Absent	Absent		Present
Intercalated duct function	Stem cells	Stem cells	Stem cells	Secretin ---- bicarbonate rich fluid
Striated duct	Numerous	Numerous	Numerous	Absent
Main duct	stratified columnar epithelium. The distal end is lined with non-keratinized stratified squamous epithelium			Col, EEC & goblet cell
Myoepithelial	Less Numerous	Numerous	Less	Absent

Question



Which of the following best differentiates the pancreas from the parotid gland?

- a. Numerous serous acini
- b. Few mucous acini
- ☒ c. Absent striated ducts
- d. Formed of lobules

Summary



The pancreas is a mixed gland.

The exocrine pancreas is formed of serous and ducts

The duct system is formed of centro-acinar cells, intercalated ducts, intralobular collecting duct, interlobular ducts and main & accessory Pancreatic ducts

Pancreas



- **Key Points:**

- Microscopic structure of exocrine pancreas
- Structure/ function relationship of exocrine pancreas
- Differences and similarities between pancreas and parotid glands

Suggested textbooks



- 1- Junqueira`s Basic Histology; Text and Atlas. 14th edition 2016, pp: 332.
- 2- Histology atlas and test: Michael H. Ross and Wojciech Pawlina, 7th edition, 2015, pp: 553



**Thank
You**

Mahalo
Kiitos

Tack
Grazie
Obrigado

Thanks

Takk
Gracias

Merci

